CLAIMS

1. A method of isolating a nucleic acid from a biological solution, that may contain other nucleic acids, proteins, other high molecular weight compounds, salts and other low-molecular weight substances, which method comprises to selectively precipitate the desired nucleic acid, while leaving other species in solution, by adding a polycationic precipitating agent to the solution and allowing it to form an insoluble complex with said nucleic acid, wherein the precipitating agent is a highly charged linear polymer that comprises quaternary amino groups, and wherein the precipitating agent is added in the presence of salt in such an amount that the charge ratio [+] / [-] between polycationic precipitating agent and nucleic acid is ≥ about 0.5, preferably ≥ about 1, during the precipitation.
2. A method according to claim 1, wherein the precipitating agent comprises at least 25 positive charges.
3. A method according to claim 1 or 2, which comprises a step of estimating the number of negative charges in the biological solution before addition of the precipitating agent.
4. A method according to any one of the preceding claims, wherein the desired nucleic acid is a plasmid.
5. A method according to any one of the preceding claims, wherein the biological solution is a cell lysate.
6. A method according to claim 5, wherein the cell lysate is an alkaline cell lysate.
7. A method according to claim 5 or 6, wherein the cell lysate is pre-treated before addition of the precipitating agent.
8. A method according to any one of the preceding claims, wherein the ratio of polymer molecular weight (gram per mol)/polymer charge (number of charges per polymer chain) in the precipitating agent is less than about 1000, preferably less than about 400.
9. A method according to claim 8, wherein the precipitating agent comprises at least about 500, preferably at least about 1000, positive charges.
10. A method according to any one of the preceding claims, wherein the precipitating agent is selected from the group that consists of poly(N,N'-

dimethyldiallylammonium chloride), an aliphatic ionene bromide and a poly(N-alkyl -4-vinylpyridinium halide).

11. A method according to any one of the preceding claims, wherein the salt concentration of the solution is controlled during the addition of the precipitating agent to allow the quantitative selective precipitation of the nucleic acid/polycation complex.

12. A method according to any one of the preceding claims, which also comprises to recover the desired nucleic acid from the precipitate so formed by separating the precipitate from the solution and subsequent dissolution and/or destruction of the complex.

13. A method according to claim 12, wherein the polyelectrolyte complex is dissolved and/or destructed by addition of a salt to free the desired nucleic acid in the solution.

14. A method according to claim 12 or 13, wherein the dissolution and/or destruction of the complex is performed at a salt concentration above 0.5 M, preferably above 3 M, depending on the charge ratio [+] / [-] and salt nature.

15. A method according to any one of the preceding claims, which also includes to recover the desired nucleic acid from the solution after separating the precipitate.

16. A method according to any one of claims 12-15, which comprises to isolate a first desired nucleic acid from the first precipitation formed, to separate said first precipitation from the biological solution and to precipitate a second desired nucleic acid from the remaining solution by a continued addition of precipitating agent.

17. Use of a method according to any one of claims 1-16 for isolating nucleic acids that have been subjected to modification reactions.